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US 5332049 A US 4658896 A US 4436118 A
US 4434125 A US 4146060 A

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(54) Method for securing a well tool to a tubular and well tool adapted for said method

(57) A well tool such as a centraliser (100), stabiliser or stop collar is provided with seals (106) and a passageway (109) provided with a check valve (107). In use the tool (100) is pushed over the end of a tubular and slid along to a desired position. Adhesive is then injected through passageway (109) into the space between the tubular and the bore (105) of the tool (100). On curing the tool (100) is firmly secured to the tubular.

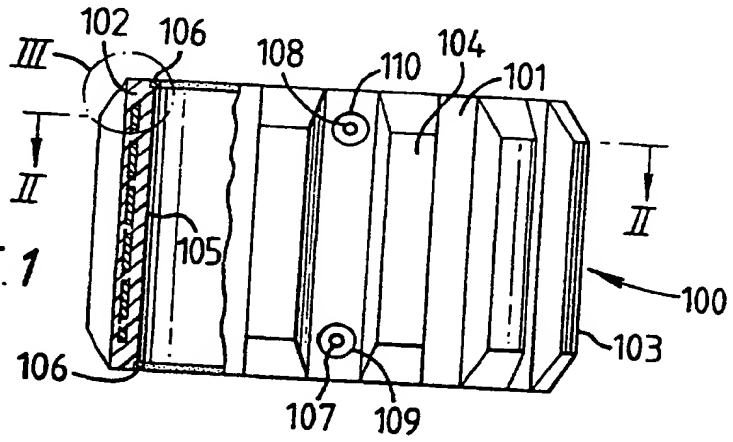

FIG. 1

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

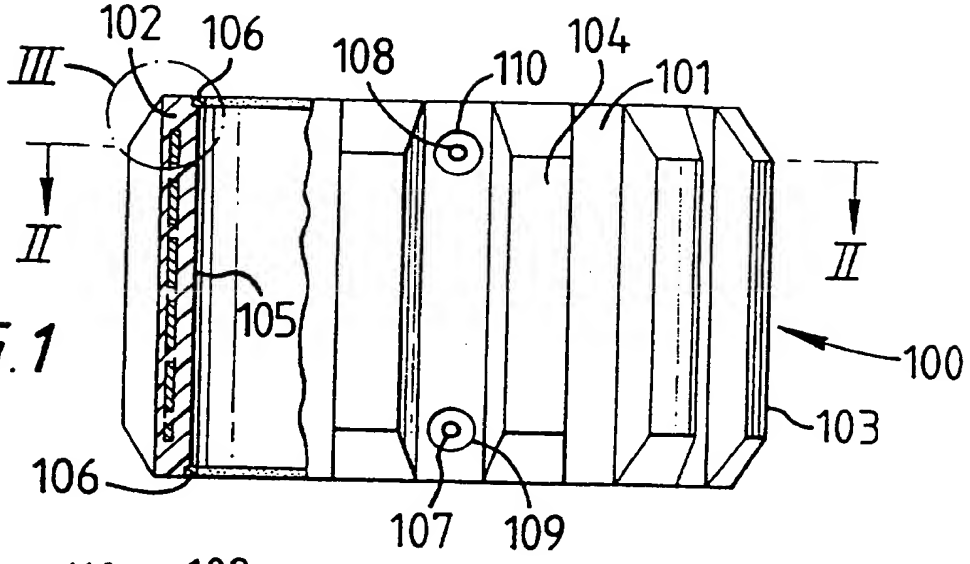

FIG. 1

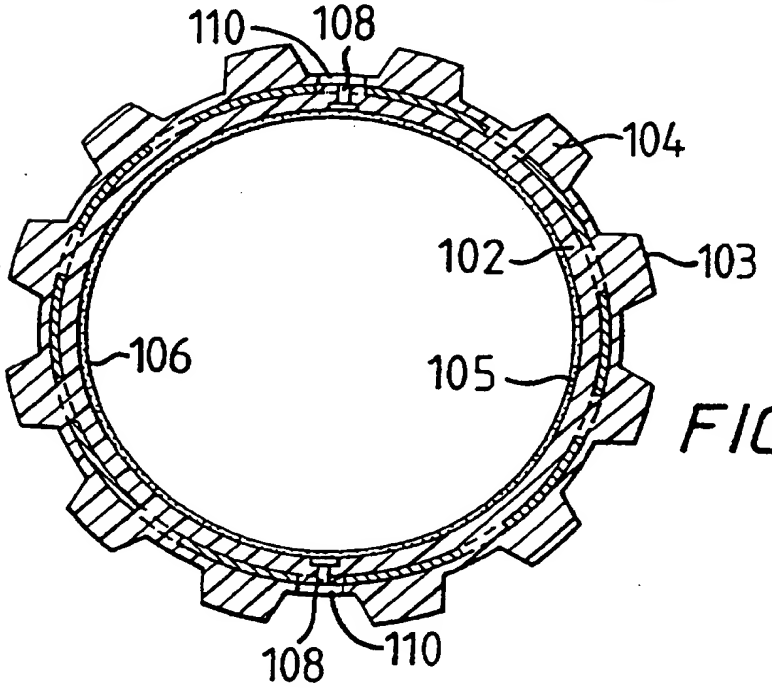

FIG. 2

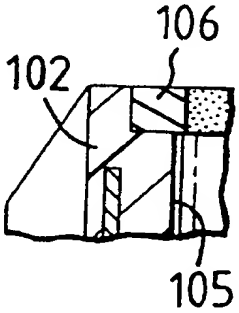

FIG. 3

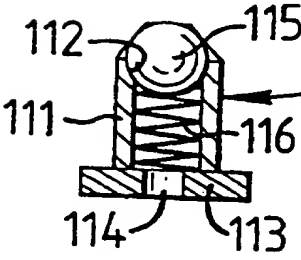

FIG. 4

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Method for Securing a Well Tool to a Tubular and Well Tool Adapted for Said Method

This invention relates to a method for securing a well tool to a tubular and a well tool adapted for said method.

During the construction of oil and gas wells a bore is drilled in the ground. A string of casing is then lowered into the bore and the annulus between the casing and the bore filled with cement.

In order to maintain the casing centrally in the bore during the cementation operation well tools known as centralizers are mounted on the casing at discrete intervals.

Typically, centralizers are made of steel or aluminium and are secured to the casing. When traditional steel casing is used the centralizers can be secured to the casing by bolts which are threadedly mounted in the centralizers and which can be tightened so that their ends bear against the casing. Whilst this method of attachment is quite acceptable for use with traditional steel casing it is not suitable for use with premium tubulars which could be damaged by the bolts. With such tubulars it is usual to retain the centralizer between two stop collars one of which is secured to the casing adjacent each end of the centralizer. Whilst this is a common solution it is relatively expensive if the centralizer does not have to be rotatably mounted on the tubular since it involves the use of three parts, i.e. the centralizer and the two stop collars. In addition the stop collars can cause some damage to the tubulars if they are not properly fitted.

Centralisers are also used for centring one string of tubulars within another. They are also used for holding drill strings centrally in a bore or length of casing. In these applications the drill string is

preferably rotatable relative to the centralizer which is often referred to as a "stabilizer" in such applications.

According to one aspect of the present invention there is provided a method of securing a well tool to a tubular, characterised in that said method comprises adhering said well tool to said tubular.

The present invention also provides a tubular having a well tool secured thereto by adhesive.

In its simplest form the adhesive could simply be applied to one or both the well tool and the tubular prior to assembly and allowed to cure with the well tool mounted on the tubular in the desired position.

However, it is preferred that the well tool be located on the tubular at the desired position and adhesive injected into a space between the well tool and the tubular.

The present invention further provides a well tool having a bore disposable circumjacent a tubular and means for introducing adhesive into said bore.

Preferably, said means comprises a first passageway which extends through said well tool and opens into said bore.

Advantageously, said first passageway is provided with a check valve to inhibit adhesive flowing from said bore to the outside of said well tool.

Preferably, said well tool is provided with a pair of spaced-apart seals to contain said adhesive therebetween.

Advantageously, said seals are disposed one adjacent each end of said well tool.

It will be appreciated that, in use, adhesive could be introduced into the space between the bore and the tubular until it oozes past one or both the seals.

Preferably, however, the well tool is provided with

a second passageway to allow air to escape as adhesive is introduced through said first passageway.

Advantageously, said second passageway is provided with a check valve which normally inhibits flow from said bore but which can be upset to prevent such flow.

The well tool itself preferably comprises a unitary body which can be placed on the end of a tubular and slid therealong to the desired position. However, it could also comprises a two piece body mountable on a tubular at any desired position.

Advantageously, the well tool comprises plastics material, for example polyurethane or epoxy, and is preferably open moulded.

Preferably, said well tool comprises a centralizer. In such an embodiment the periphery of said centralizer is preferably provided with a plurality of ribs to facilitate the passage of circulating fluid and/or cement past said centralizer.

If desired, the bore of said well tool may be stepped to define a cavity to accommodate said adhesive.

Advantageously, said well tool has a body which is reinforced, for example with glass fibre or metal.

The well tool may be, for example a centralizer, a stop collar or a pipe protector.

For a better understanding of the present invention reference will now be made, by way of example, to the accompanying drawings, in which:-

Fig. 1 is a side view, partly in elevation and partly in section, of one embodiment of a well tool in accordance with the present invention;

Fig. 2 is a section taken on line II-II of Fig. 1;

Fig. 3 shows, to an enlarged scale, the detail encircled and identified by reference numeral III in Fig. 1; and

Fig. 4 shows, to an enlarged scale, a check valve used in the well tool of Fig. 1.

Referring to the drawing there is shown a well tool in the form of a centraliser which is generally identified by the reference numeral 100.

The centraliser 100 comprises a body 101 which comprises an inner cylindrical portion 102 and an outer portion 103 which defines twelve ribs 104 which extend longitudinally of the centralizer 100.

The inside surface of the inner cylindrical portion 102 defines a bore 105.

Adjacent each end, the centralizer 100 is provided with a sealing ring 106 the radially innermost surface of which projects marginally inwardly of the surface of the bore 105.

The centralizer 100 is also provided with two check valves 107 and 108 which are disposed in respective passageways 109, 110 adjacent the ends of the centralizer 100.

Both check valves 107 and 108 are identical, details of check valve 107 being shown in Figure 4. In particular, the check valve 107 comprises a tubular body 111 having a seat 112 at one end and a flange 113 having a pin hole 114 at the other end. A ball 115 is shown resting on seat 112 but is biased away from the seat 112

by a light spring 116.

Both check valves 107 and 108 are arranged with their flanges 113 facing radially outwardly.

In use, sealing ring 106 is covered in a suitable lubricant such as silicon grease and the centralizer 100 is placed over the end of a tubular (not shown). The centralizer 100 is then slid along the tubular until it reaches the desired position. Once in position adhesive is injected through the pin hole 114 using a gun similar to a high pressure grease gun. The adhesive travels through the passageway 109 and starts filling the annular space between the outside edge of the tubular and the base 105 of the centralizer 100.

If desired adhesive could be injected past the check valve 107 until it oozed past one or both sealing rings 106. However, it is preferred to insert a pin through the pin hole of check valve 108 to dislodge the ball 115 at the commencement of injection of the adhesive. When the space between the bore 105 and the tubular is substantially full adhesive passes through passageway 110, past the ball of check valve 108 and exits through the space between the pin and the pin hole. At this time injection of further adhesive is stopped, the pin removed and the adhesive allowed to set.

Various modifications to the embodiment described are envisaged, for example the tubular could be made from steel, alloy or fibreglass. The well tool could be made from steel, alloy or plastics material. In the case of plastics material the body could be made as a one piece open moulding or in two pieces as shown. When formed in two pieces the body 101 preferably comprises a fibreglass or metal reinforced injection moulded inner cylindrical portion formed from a relatively hard plastics material for example epoxy or equivalent covered by

an outer moulded portion of a relatively soft polyurethane. This construction has the advantage of low friction between the ribs 104 on the outer portion 103 and the bore or a casing through which the well tool is being lowered.

In certain applications it may be desirable for the well tool to be able to rotate relative to the tubular member on which it is rotated, for example where the well tool is being used as a stabilizer to centre a drill string in a casing string or passing casing through a highly deviated bore. In such cases it may be desirable to rotatably mount a well tool on a tubular but restrain the well tool from axial movement relative to the tubular by means of stop collars disposed to either side of the well tool and mounted fast on the tubular by adhesive. In such an embodiment the stop collars may be provided with seals and with check valves in an analogous manner to the centralizer 100.

Claims

1. A method of securing a well tool to a tubular, characterised in that said method comprises the adhering said well tool to said tubular.

2. A tubular having a well tool secured thereto by adhesive.

3. A well tool having a bore (105) disposable circumjacent a tubular and means (107) for introducing adhesive into said bore (105).

4. A well tool as claimed in Claim 3, characterised in that said means comprises a first passageway (109) which extends through said well tool and opens into said bore (105).

5. A well tool as claimed in Claim 4, characterised in that said first passageway (109) is provided with a check valve (107) to inhibit adhesive flowing from said bore (105) to the outside of said well tool.

6. A well tool as claimed in Claim 4 or 5, characterised in that said well tool is provided with a pair of spaced apart seals (106) to contain said adhesive therebetween.

7. A well tool as claimed in Claim 6, characterised in that said seals (106) are disposed one adjacent each end of said well tool.

8. A well tool as claimed in Claim 6 or 7, characterised in that it is provided with a second passageway (110) to allow air to escape as adhesive is introduced through said first passageway (109).

9. A well tool as claimed in Claim 8, characterised in that said second passageway (110) is provided with a check valve (108) which normally inhibits flow from said bore (105) but which can be upset to permit such flow.

10. A well tool as claimed in any of Claims 3 to 9, characterised in that it comprises plastics material.

11. A well tool as claimed in Claim 10, characterised

in that it consists of plastics material.

12. A well tool as claimed in any of Claims 3 to 11, characterised in that it comprises a centralizer.

13. A well tool as claimed in Claim 12, characterised in that it is provided with a plurality of ribs (104) to facilitate the passage of circulating fluid and/or cement past said centralizer.

14. A well tool as claimed in any of Claims 3 to 13, characterised in that the bore (105) of said well tool is stepped to define a cavity to accommodate said adhesive.

15. A well tool as claimed in any of Claims 3 to 14, characterised in that it has a body which is reinforced.

16. A well tool as claimed in any of Claims 3 to 15, characterised in that said adhesive comprises an epoxy.